An Aleut cape and cap made of sea mammal intestine: from storage to display

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SUMMARY The British Museum’s collection of Arctic garments includes an important nineteenth-century Aleut cape (Am1986,18.14) and cap (Am1986,18.15). Both are made of sea mammal intestine using traditional techniques but show a distinct Russian influence in the tailoring. The cape resembles a military cloak, with a high collar decorated with embroidered appliqué bands. The cap has the same form as those worn by Russian sailors and is surmounted by an appliqué roundel. Although the cape and cap were acquired by the British Museum from the Royal Institution of Cornwall at the same time, they are not part of a single ensemble. The properties of sea mammal intestine, from which they are made, make them light and waterproof garments for use in poor weather, but the fine construction and rich decoration could indicate that they were intended for ceremonial use.

The cap and cape were dusty, crumpled and brittle, with numerous tears and areas of loss that hindered handling or interpretation. Recent conservation treatment has brought out the original beauty of these garments and enabled them to be placed on public display safely. The conservation was a complex and lengthy process involving the gentle cleaning and reshaping of the gut, followed by the application of unobtrusive repairs to the damaged areas and the construction of tailored mounts to enable safe display and storage. The treatment of the cape provided the opportunity to carry out scientific analysis on the materials and so shed new light on its manufacture. The majority of pigments detected are unlikely to have been available locally, with the possible exception of the black and green pigments. Northern fur seal hair was identified on the skin used in the decorative borders, and the use of caribou hair for the embroidered decoration was confirmed. The long tassels of hair were identified as human hair. This contribution demonstrates that gut clothing that has been in long-term storage and is often seemingly in very poor condition can, with appropriate treatment, be sensitively restored for display.

Introduction The British Museum has some remarkable Arctic garments in its collection, among the finest of which are a nineteenth-century Aleut cape (Am1986,18.14: Figure 1) and cap (Am1986,18.15: Figure 2) made of sea mammal intestine. The garments were constructed following traditional techniques but show a distinct Russian influence in the tailoring. The full/calf-length cape reflects the style of a military cloak, showing a distinctive high collar decorated with embroidered appliqué bands and an additional attached short shoulder cape around the shoulders. In common with other rain gear, such as pull-over parkas, this waterproof cape was called kamleika in Russian, and indalux or shaulonĝ in Unangam Tunuu, an Eastern Aleut dialect, both terms meaning ‘cape’ [1]. The cap reproduces the form of Russian sailors’ headgear. It is made of small strips of gut joined radially at the centre with an appliqué roundel. The indigenous people called this hat saleeĝuu or slapkun, a word derived from Russian that means ‘woman’s fancy hat’ [2].

Created with outstanding skill and of exceptional beauty, they exemplify the resourcefulness of indigenous peoples, their extraordinary adaptation to a tough environment, and their response to the colonial intrusion of European traders and colonists. The lightweight and waterproof qualities of sea mammal intestine made these garments comfortable to wear, perfect attire for inclement weather and easily adaptable to other outerwear, but their fine construction and rich decoration could also indicate a festive or ceremonial use, as they are
most probably symbols of high status. In addition, gut clothing may also have expressed a degree of spirituality, connecting the wearer with the animal world [3; pp. 4–9].

Kamleikas and waterproof garments fashioned after Russian clothing were highly appreciated and collected by sailors and other travellers, who admired their elegance and functionality. They are also perhaps the pre-eminent hybridized objects expressive of a fraught relationship in which Native Alaskans were obliged by Russians to hunt far from home, as far south as Fort Ross in California [4].

It is known that clothing of this type, and these two items, date to the first half of the nineteenth century and that gut garments continued to be made in Alaska into the twentieth century. While their provenance and exact ethnic attribution are unclear, their style is Aleut. Although the cape and cap do not relate to each other, having been presented by different donors, both were acquired by the British Museum in 1986 from the Royal Institution of Cornwall.

On acquisition the garments were in a fragile condition and were folded flat in stiff bundles. The cape was initially conserved to improve its condition for storage. During treatment, the gut became supple enough to allow the garment to be reshaped, and extensive repair made display seem a possibility. The outcome of conservation was so remarkable that it was decided to prepare the object for exhibition in the North American Gallery, Figure 3. The cap was treated previously for storage in 1997, but it was reassessed and prepared for exhibition together with the cape. An integral part of conservation was the design and construction of bespoke mounts to provide full support and enable the proper appreciation of the garments on display. Conservation also provided an opportunity to analyse some of the materials involved in the manufacture, including the identification of hairs and pigments. It is hoped that further investigation of other material aspects and intangible values associated with these extraordinary garments will be possible in the future.
Arctic gut capes and caps

Waterproof clothing made of sea mammal gut was used across the North American Arctic. As with other clothing, including pull-over parkas and crimped/pleated sole boots, there is no indication of when or where they originated. The tradition is likely to have arisen as part of a material culture developed from the clothing of early Arctic inhabitants, the Paleo-Eskimos, in conjunction with the mammal hunting tradition of the Old Bering Sea culture, as it arose around the Bering Strait in Alaska and in Siberia around 2000 years ago, during the same period that the kayak first appeared. Even outside the winter period, waterproof clothing is vital in the north when kayaking – especially at sea – and for shore foraging and hunting.

A wide variety of transparent or semi-transparent materials was used in clothing by Eskimo peoples (Aleut, Yupik, Tłı̨chǫ, Inuit and Greenlanders). While gut from a number of species was available, seal and sea lion, animals regularly caught and killed in Alaska and elsewhere, were preferred. In the living animal, both the large and small intestines serve the biological function of enabling one-way absorption of liquids and nutrients through the gut wall into the body. This property of one-directional permeability, which arises from the layered and physical structure of the gut wall, was exploited for use in waterproof garments such as parkas [5]. Gut garments thus ‘breathed’, allowing the release of perspiration generated by the wearer. In the contemporary world of manufactured waterproof materials, one-directional permeability is termed ‘breathability’ and there a number of fabrics with a high degree of breathability, including Gore-Tex [6].

The process of creating a gut garment was summarized well by the artist, Alaskan Fran Reed (1943–2008) [7]. The intestine would first be carefully soaked and washed, then scraped on both the inner and outer surfaces. Finally, it would be inflated and permitted to dry before splitting and tailoring. Then running stitches would be used to join together the flat, folded and interleaved edges of the split intestines. Additionally, hair decoration might be added, including strips of skin with shaved hair. This hair, which was sometimes coloured red or black, could include human hair. The sewing materials employed might be sinew or grass, but in either case they swell when damp which tightens the seam and improves its waterproofness. The orientation of the strips of gut is an important diagnostic feature; in southern Alaska and the Aleutians and other Alaskan islands en route to the Bering Strait and Arctic seas.

Russians employed kamleikas in large numbers during the heyday of the Russian American Company (1799–1867) in the territory that, after it was sold to the United States, was to become the state of Alaska in 1958–1959. The women making gut garments were often paid for their work with small quantities of needles and thread. Demand for gut clothing was high and its importance so great that it was used as a form of currency. Furthermore, it has been suggested that the large quantities required to satisfy this demand contributed to the decline in pinniped (seal) species [9]. Uniquely in the Arctic, European forms of gut clothing developed in Alaska, particularly caps and, most famously, kamleikas for use by Russian officers. A significant number of these have survived, especially in Russia and what is now Finland, with further examples in American and western European museums.

British explorers were, with those from Russia and Spain, the first Europeans to map Alaska, encounter Native Alaskans and collect their material culture. From the expedition of Captain James Cook (1778–1779) onwards, until the end of the Russian period, the British Royal Navy was involved in the search for the Northwest Passage, with expeditions stopping in the Aleutians and other Alaskan islands en route to the Bering Strait and Arctic seas.

Among the best documented of the Russian-style gut capes and caps are those in the National Museum of Finland, Helsinki. These were acquired during the period when Finland was a Russian province by – among others – Arvid Adolf Etholén (1799–1876), an explorer, fur trader and governor of Russian America in the 1840s [10]. They are designated as Aleut-made, from the Pribilof Islands, north of the Aleutians and between Alaska and Siberia, centre of the fur seal hunt in the nineteenth century. All are spectacularly well decorated, presenting a similar style and methods of manufacture as the items in the British Museum collection.

Historical background and significance

The early histories of the cape and cap remain to be researched, but both were acquired from the Royal Institution of Cornwall, Truro, a museum that dates to 1818–1821. The cape was presented to the Royal Institution of Cornwall by a Mr Bastian and the cap by a Mrs Taylor. While the objects may come from naval expeditions, it is also possible that they...
were purchased by Hudson’s Bay Company traders from a Russian or Oregon territory trading post. The Hudson’s Bay Company was active well into the middle of the nineteenth century in Russian America, engaged in the fur trade and in supplying the Russian colony, initially from Oregon and, after 1846, from what was to become British Columbia. The cape is of a type worn by Russians of high status, perhaps high-ranking mariners, priests or officials from the Russian American Company, as has been documented for similar objects [11; p. xxvii]. Other accounts refer instead to natives wearing these clothes on special occasions and for ceremonies [10; p. 147, 12; p. 157, 13]. The cap is not, however, directly associated with the cape and may perhaps be a women’s accessory for use in dancing ceremonies and weddings [2, 14; p. 218].

Description of the garments

The cape has a high stiff collar and a small attached shoulder cape making it easy to wear over other outer clothes. It is constructed using a relatively thin and semi-translucent gut that shows an opaque white strip towards the centre of each band. Although it is likely to be sea lion gut, the most common material used for waterproof clothing in the Aleutian Islands [12; p. 158], secure identification has not yet been possible. The gut bands are arranged horizontally and secured with sinew thread using a close running stitch. Inserted into the seams are small decorative tufts of red and blue wool fibres, possibly from trade cloth, and long tassels of grey hair that has been identified as human, see the appendix and Figure 4a [15]. The hairs are stitched to the cape facing upwards, so that when they fall downwards they produce a striking, arched effect. This could also serve to propel water off the garment [9], although it is possible that this orientation also had a spiritual or protective function. In relation to this, the Russian missionary and prelate Ivan Veniaminov (1797–1879) refers to a practice of Aleut elders who “in dying, frequently blessed their relatives, and gave them some of their grey hairs, or fragments of their clothing, or arms which they had carried in wars, and ordered them to preserve them as charms against misfortune and disease” [16; p. 155].

The cape is also embellished at the edges and the collar with appliqué bands of northern fur seal skin, see the appendix and Figures 4b and 5 [15]. The bands are painted using several pigments identified as a carbon-based black, vermilion, azurite, a blue-green obtained by mixing azurite and lead-tin yellow (type II) and a green obtained from the same yellow pigment and a green earth [17]. Most of the pigments detected are unlikely to have been available locally, with the possible exception of the black and green pigments, suggesting that they were obtained through trade [17]. They seem to have been applied with a proteinaceous binder, but further investigations would be required to determine its nature and the possible use of additional pigments [17]. The appliqué bands also incorporate narrow strips of white caribou fur and a fine decoration consisting of white and brown caribou hair, see the appendix and Figure 4c [15]. This comprises crisscross braided patterns and stitched inverted triangles along the edgings, both of which
are motifs characteristic of Aleut embroidery, Figure 5 [18]. The trimmings are also ornamented with small brown feathers inserted into the stitching.

The cap is made of a gut with a similar colour to the cape, but which is slightly thinner and without the characteristic central opaque white strip. The top of the cap is made by joining triangular pieces of gut arranged radially, Figure 2. It is crowned with a roundel of a thicker gut or skin that is painted in black, dark red and blue-green, and ornamented with white caribou hair embroidery. The sides of the cap are formed from 10 trapezoid pieces, each made by stitching two pieces together, Figure 2. The seams are decorated with red and blue woollen yarn fringes and there is a fine strip of a thicker black gut or skin inserted between the seams. The lower rim or headband of the cap is formed from a single strip of gut, decorated at the lower edge with a fine strip of the thicker black gut or skin with white caribou hair embroidery.

**Condition before treatment**

On acquisition the objects were in a poor but stable condition. The cape was severely misshapen, since it had been stored folded up into a bundle, Figure 6. In consequence, there were misalignments on the pleats, flattened areas and numerous hard creases that were susceptible to splitting. Handling was difficult due to numerous tears distributed throughout the surface. In addition, there were several missing areas, ranging in size from 2.5 to 5 cm², localized mainly along the front opening edges of the cape, the losses being especially severe on the right side, Figure 7a. The surface of the cape was soiled and the gut exhibited a dark, dull colour that obscured its translucency. There are no accounts of previous treatments involving the application of dressings and the soiling seemed to come from dust. In addition, abundant frass deposits and moth casings from previous pest activity had accumulated underneath the pleats and between wrinkles in the gut. Some of the wool fringes were affected by pest damage and were detached from the seams or losing threads. Similarly, the hair tufts were entangled and some had become detached from their original location; it is likely that the hair tufts would have been fuller originally. The feather decoration was mainly lost, probably due to earlier pest damage.

The cap had been conserved in 1997, before which it was completely flat and two-dimensional, Figure 8. It was stiff, slightly soiled and showed fairly extensive evidence of past insect attack. There were splits and areas of loss, and the top was distorted in the area of the decorative roundel.

**Conservation treatment**

**Rationale for treatment**

Before conservation, the cape and cap were so fragile that even careful handling posed the risk of further damage through tears and loss of material. Initially, conservation treatment was aimed at stabilizing damage and ensuring the long-term preservation of the objects in storage. However, as the treatment progressed, the cleaned gut recovered its translucency and the repairs enabled the garments to regain enough structural strength for them to be displayable.

Mounting was essential to guarantee both safe display and future storage of the objects, allowing the public appreciation of extremely fragile objects, otherwise relegated to storage due to their poor condition. Conservation provided an opportunity to investigate some of the material characteristics of the garments and add to the knowledge on gut clothing. It was possible to take several small samples for identification, with the aim of gaining a better understanding of the process.
of manufacture and to shed light on aspects related to the provenance and significance of these objects.

Cleaning and preliminary reshaping

Cleaning gut garments generally raises the question of removing possible oils or lubricants applied in the original context [19; p. 92, 20; p. 82, 21; p. 222], or by conservators as a means to keep the gut supple and flexible [22; p. 2]. Unfortunately, such dressings can lose their intended qualities of increased suppleness over time and be potentially damaging when aged and soiled, as they become acidic [23; pp. 2–3]. In addition, dirt can carry mould spores, fungi and other minuscule organic materials that can prove to be food sources for pests. For these reasons and because no evidence of any original dressing was found, it was finally decided to surface clean the gut on both objects.

The gut on the cape was too brittle and stiff to withstand dry cleaning or vacuuming. As an alternative, solvent cleaning was considered to offer the additional advantage that it would help make the gut suppler and allow some crumpled areas to be unfolded as part of a preliminary reshaping. The cape was surface cleaned on both the inner and outer surfaces with cotton swabs slightly moistened with a 1:1 v/v mixture of deionized water and industrial methylated spirit (IMS). Although water alone appeared to be effective to remove dirt, when mixed with IMS to reduce the surface tension it evaporated more quickly from the surface, preventing the gut from becoming too limp and unmanageable while working. The wool fringes, hairs and feather decoration were gently cleaned and swabbed with a fine brush moistened in the same solution, using blotting paper underneath to absorb excess solvent and remove the dirt.

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The cape was only slightly soiled, so dry cleaning with a soft brush and vacuum was sufficient to remove superficial deposits of dirt. The cape was placed in a humidification chamber to allow the gut to relax gradually. Over a period of five hours the relative humidity (RH) was slowly raised to 70% and then to 90%, during which crumpled soft nylon net was gradually added to pad it out. The cape was then left overnight at 70% RH and the following day was supple enough to continue the reshaping process by adding additional crumpled nylon net and to start cleaning the gut surface using cotton wool swabs slightly moistened in deionized water. The cape was left in the humidification chamber at 70% RH for a second night and the combined gradual cleaning and reshaping process continued the next day. The distortion in the area of the decorative roundel was reduced but not eliminated entirely.

Repair

Extensive damage through numerous tears and areas of loss made the cape fragile and difficult to manipulate. Its thinness and translucency required a repair material that was unobtrusive and sympathetic with the aesthetic qualities of gut and able to return integrity and strength to the garment. Kasenshi, a non-woven 100% polyester fabric was found to be a suitable choice. This fabric is notable for its fineness, suppleness, transparency and strength, and presents a slightly glossy surface that resembles the lustre of the gut used in some objects. Although it is commonly used as a release fabric in paper conservation [24], kasenshi has also proved to be an excellent material for repairs [25, 26]. It has greater tensile strength, showing greater resistance to tear, than other repair materials such as long-fibre mulberry paper, and it is also very easy to colour with acrylic pigments diluted in water. This treatment provided an opportunity to test this fabric as a repair material for gut.

The patches used for repair consisted of strips of kasenshi cut to size, slightly wider than the original gut strips, and coloured with Liquitex® acrylic paints diluted in deionized water. Some variations in colour were needed to adapt to minor differences in the original gut and make the transitions between the gut and the repair less obtrusive. The patches were adhered with a 20%...
solution of Klucel G® (hydroxypropylcellulose) in a 1:1 v/v mixture of deionized water and IMS, applied to the gut with a fine sable brush along the edges of the areas of loss, Figure 9. The edges of the repair patches were further secured to the seams of the gut strips with Vinamul 3252® (polyvinyl acetate/polyethylene copolymer) applied undiluted along the seams. The application of moisture from an ultrasonic humidifier was necessary before carrying out some of the repairs in order to relax the gut and make it flexible to reshaping, Figure 10. Both adhesives are water based and allowed good workability while the gut was moistened. To adhere the edges of the areas of loss, which were bent or curled and required some manipulation before final adhesion, Klucel G was chosen for its flexibility; Vinamul 3252 was preferred for the seams because it produced a stronger bond. When the adhesives were dry, the excess fabric on the inside of the repairs was trimmed to the size of the seams, Figure 7b. Loose hair tufts and wool fringes were secured to the seams using the same preparation of Klucel G. Some fringes were further secured with a piece of dyed silk crepeline to provide additional support and avoid loss of threads. The cap was repaired in 1997 with fine mulberry paper coloured with Liquitex acrylic paints diluted in distilled water. Kasenshi was not available at the time and for this cap a fine mulberry paper proved an ideal repair material. Although there were numerous holes in the cap from past insect attack they were small, and the repairs did not need to carry much weight, in contrast to the heavy pleated cape. Paper repairs would still be considered as a possible repair material for gut artefacts today, the choice between polyester and paper depending on the particular object and treatment, taking into account the physical and visual qualities required, including the stiffness, thickness and translucency of the gut (which varies from object to object), the strength of repair required and the choice of repair adhesive. There is a wide variety of mulberry papers available from which to choose and these vary in appearance, thickness, flexibility and strength. The patches were applied to the cap – using a 50% v/v solution of Vinamul 3252 in distilled water as the adhesive – while it was still relaxed and slightly moist from cleaning the inside of the area to which the repair patch was to be applied with water. In order to minimize the visibility of the repair through the translucent gut, the patches were shaped and cut to cover a whole damaged section, allowing them to be attached along the original seams before the damaged edges of the gut were adhered to the paper patches. Overall reshaping of the cape

Once the repairs were finished, the cape was again exposed to controlled humidification for overall reshaping. Due to the large dimensions of the cape, a humidity tent that allowed sufficient space to work inside was constructed with polyethylene sheeting. The tent was suspended from the ceiling, leaving an opening that could be sealed to create a controlled environment, Figure 11. The cape was provisionally mounted on a mannequin and kept inside the tent for several hours as the humidity was raised progressively using an ultrasonic humidifier until the RH was 80%. The whole process was carefully monitored to avoid excessive humidity, which might result in over-softening of the gut or the possibility of fungal growth. Unwanted hard creases on the pleats were lessened by manual reshaping and the local application of additional moisture with the ultrasonic humidifier. Once a realistic shape was achieved, the humidity was reduced progressively to closer to ambient levels of around 50% RH. The neck was relaxed using moisture vapour applied through a Gore-Tex membrane. A piece of blotting paper slightly moistened in deionized water was placed on top of the Gore-Tex and covered with a piece of polyethylene sheeting to create a sealed, moist environment. Soft-padded carbon fibre clamps were fixed around the neck to aid further reshaping.
Mounting
Gut clothing is extremely fragile, making padded supports and mounts necessary to guarantee long-term preservation, facilitate access or maintain a desired shape over time, Figure 1. The cape and cap needed to be mounted for storage and display, and it was preferred that these mounts could serve for both purposes. The mounts needed certain characteristics to respond to the structural and aesthetic requirements of the objects, providing a safe support, creating a realistic effect, minimizing direct handling and enabling easy removal and remounting if required. Common materials used for the construction of mounts for gut clothing have been self-adhering paper [27, 28], Plastazote® or Ethafoam® [29, 30]. In this case, it was decided to use buckram as it was inexpensive and easy to apply. Buckram has traditionally been used in millinery and bookbinding, but also in the construction of museum mounts for costumes and accessories [31, 32]. It consists of a linen cloth pasted with an adhesive and applied in layers or cut strips that are overlapped until the desired rigidity has been achieved. Although it can be purchased ready made, for these mounts buckram was made to purpose using conservation grade materials: scoured linen cut into strips and pasted with a 5% w/v solution of Lineco® pure wheat starch in water.

The mount for the cape consisted of a rigid buckram bust shape constructed over an adaptable mannequin. Once dry, this was coated with a 10% w/v solution of Paraloid B72® in acetone to add extra stiffness and minimize the risk of insect attack. The bust was padded with polyester wadding and an elastic cotton jersey fabric to create a smooth, soft surface in contact with the object. This fabric was stitched towards the neck and shoulders to accommodate the cape safely.

The lower part of the cape was provided with volume by means of a hooped skirt. This was made with cotton calico using double Rigilene® rings (100% polyester boning) inserted into horizontal stitched pockets. The front of the skirt was covered with a thick piece of polyester wadding to conceal the undulations of the rings and then the whole skirt was covered with an undyed medium weight silk habutai tunic, which provided a very soft surface in contact with the cape. The skirt was secured with cotton tape straps fastened to the bust shape with Velcro®.

To enable the cap to maintain its own weight and shape, an internal support was needed. A ceramic bowl was used as a mould to construct a dome-shaped buckram mount. Afterwards, a ring of rigid, acid-free cardboard was attached at its base. The ring was extended beyond the rim deliberately, so that it raised the cap to allow easy handling. Although visible when the cap is on display it is not particularly obtrusive, Figure 2. In common with the buckram support for the cape, the mount was coated with Paraloid B72, padded and covered with fabric.

Conclusions
Conservation allowed the physical revitalization of two significant objects and will aid their long-term preservation in the Museum. The appearance and structural strength of the objects were considerably improved after treatment and the specialized mounts will allow public display and future accessibility to the objects in storage. Scientific investigation of their component materials has provided new information on the use of human hair and northern fur seal skin in the decoration of the cape. The use of caribou hair was confirmed and the investigation of the pigments used on the appliqué bands of decoration sheds new light on their composition. Little work has been carried out on the materials and techniques used to colour these decorative elements, and the results of analysis provided new insights into the extensive trade links that must have brought pigments to the region that were unlikely to have been available locally. The improved condition of the garments will facilitate further technical investigations and consultations to improve the understanding of their significance and construction.

Appendix
Identification of hairs by scanning electron microscopy (SEM)
Examination of the hair samples and comparative reference specimens was undertaken in the Hitachi S-3700N variable pressure scanning electron microscope (VP SEM) using the backscatter electron (BSE) detector, mostly at 15 kV but sometimes at 10 kV depending on the sample. Magnifications in the range ×37 to ×700 were used and the preferred working distance was 0.12 mm, extended from 10.5 to 13.9 mm as required. Since the condition of the hairs varied, the SEM chamber was only partially evacuated – to 40 Pa, or sometimes 30 Pa. With the BSE detector, 3D mode (rather than Compositional) was preferentially selected to maximize the opportunity to reveal diagnostic features for identification, detect traces of wear and abrasion from use or preparation, and to show dirt, encrustations and fungal hyphae, Figure 4. Most of the hairs examined were placed on adhesive carbon discs mounted onto aluminium SEM stubs; no other sample preparation was required.

The advantages and drawbacks of using hair/fibre atlases, online hair/fibre image databases and texts as references have been discussed in detail elsewhere [33], but key points relevant to the identifications of human, seal and caribou hairs in this study are reiterated here. Online and printed hair atlases mostly consist of images using dark or bright field polarized light microscopy (PLM), or using differential interference contrast optical microscopy. While such images are very useful for modern material, it is always problematic to try to compare these with, and attempt to match key features on, historical, aged or archaeological hairs, many of which have been altered through use, wear, damage, the application of pesticides and the natural processes of ageing and deterioration. ‘Textbook’ images of clean, recent hairs, whether using PLM or SEM, cannot replicate the complex characteristics exhibited by historical or archaeological hairs, many of which are visible in Figures 4a–4c. In consequence, aged and modern reference specimens were vital for the identification of the Aleutian cape hair samples.
Acknowledgements

The authors would like to thank Alison Lister and Frances Hartog for their work on the cap, and Arianna Bermuci and Siska Genbrugge for work on the cape. Within the British Museum, thanks are due to Catherine Higgitt, Janet Ambers and Joanne Dyer for carrying out analysis of the pigments and binder; Devorah Romanek, as curator of the North American Gallery refurbishment in 2011, selected the Cape and cloak for display.

Materials and suppliers
- Gewebe polyester paper, weight 10 g.m⁻²: Yoshida Co. Ltd, Japan.
- Rigilene® polyester boning: McCulloch and Wallis, 25-26 Dering Street, London W1S 1AT, UK. Email: mailorder@macculloch.com

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